State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Northern District

RECREATION USE SURVEY OF INDIAN CREEK, PLUMAS COUNTY 1981

Technical Information Report No. 82-1

Prepared by
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This report was prepared to summarize information collected under WO 1600-4268 as part of an evaluation of the revised operation of Antelope Reservoir, an element of the Department's Instream Water Use Program. This report has received only limited review; it is intended for internal use and should be considered preliminary and subject to revision.

April 1982

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SUMMARY

A survey of streamside recreation along upper Indian Creek, Plumas County, was made in 1981. This survey was a follow-up to a three-year program to estimate the amount and types of recreation with augmented flow conditions (Hinton and Haines, 1981). The random sample survey combined roving use counts with interviews of anglers to gather information on recreation activity, visitor origin, and a creel census to determine angler success.

There were an estimated 13,500 hours of recreation use on upper Indian Creek between April 25 and November 15, 1981. The most frequently observed activities were camping, fishing, relaxing, and gold seeking. About 31 percent of the anglers lived in the northeast counties of California, mostly Plumas and Lassen Counties. Anglers caught about 1,600 trout in 3,600 hours of fishing on the creek. The 1981 data are compared with results of previous surveys.

INTRODUCTION

Indian Creek below Antelope Dam offers an opportunity to implement the Department of Water Resources (DWR) water management policy, adopted in 1975, which states, "Instream uses for recreation, fish, wildlife, and related purposes shall be balanced with other uses." When Antelope Dam began operation in 1964, streamflows in Indian Creek below the dam were increased and stabilized. Minimum flows were increased from about 0.08 m^3/s (3 ft^3/s) to 0.28 m^3/s (10 ft^3/s), resulting in a five-fold increase in trout populations several years later (Gerstung, 1973). Presumably, fishing and related recreation along the creek were likewise enhanced. Increasing the flow to 0.56 m^3/s (20 ft^3/s) would roughly double trout habitat over the post-project level (DWR, 1979).

On a trial basis, Antelope Reservoir was reoperated for a three-year period starting in March 1978 to increase flows in the creek in an effort to enhance recreation and fishery values without significant detriment to lake recreation. Streamflow releases were maintained at 0.56 m^3/s (20 ft^3/s) during 1978 and 1980 and the effects on recreation were monitored (Cartier, 1979, and Haines, 1981).

Severe drought conditions in northeastern California during winter 1978-79 (runoff in Indian Creek was 35 percent of normal) caused the release to be reduced to 0.28 m^3/s (10 ft^3/s) in January 1979. This was done to assure filling of Antelope Reservoir and to avoid the possibility of an even lower release during summer 1979. The release from Antelope Dam was maintained at 0.28 m^3/s (10 ft^3/s) from January 19, 1979, to April 20, 1980, and the effects of this schedule on recreation were monitored (Haines, 1980).

Information obtained during the three-year evaluation was summarized in a Northern District report which recommended the revised operation continue on a permanent basis (Hinton and Haines, 1981). The report also recommended limited monitoring of trout populations, recreation use, and fishing success in the upper 18 km (11 mi) of Indian Creek. About 60 percent of the fishing use and 80 percent of the trout catch occurs in this portion of the creek. Limited monitoring of this reach

would document any changes in fish populations, angler use, and catch resulting from the higher flows released during the three-year evaluation period and later.

This report describes the recreation use survey and creel census conducted along the upper creek during the 1981 trout season, April 25 to November 15. A separate report, prepared by the Department of Fish and Game (DFG), Contract Services Section, describes the fish population survey conducted in September 1981 (Villa, 1982).

DESCRIPTION OF STUDY AREA

Indian Creek is a major tributary of the East Branch of the North Fork Feather River in Plumas County. It has a rich history of gold mining, ranching, and lumber production. In recent decades, recreation use has increased rapidly with water a major attraction. Employment today is divided among services, government, logging, and lumber manufacturing. Ranches operate in Indian and Genesee Valleys.

The 1981 study area included only 18 km (11 mi) of Indian Creek from Flournoy Bridge upstream to Antelope Dam (Figure 1 and Appendix I). Antelope Reservoir did not quite fill in 1981. The downstream release was maintained at 0.28 m^3/s (10 ft^3/s) throughout the trout season, except for five days in mid-September when the release was reduced to 0.14 m^3/s (5 ft^3/s) to permit fish population sampling.

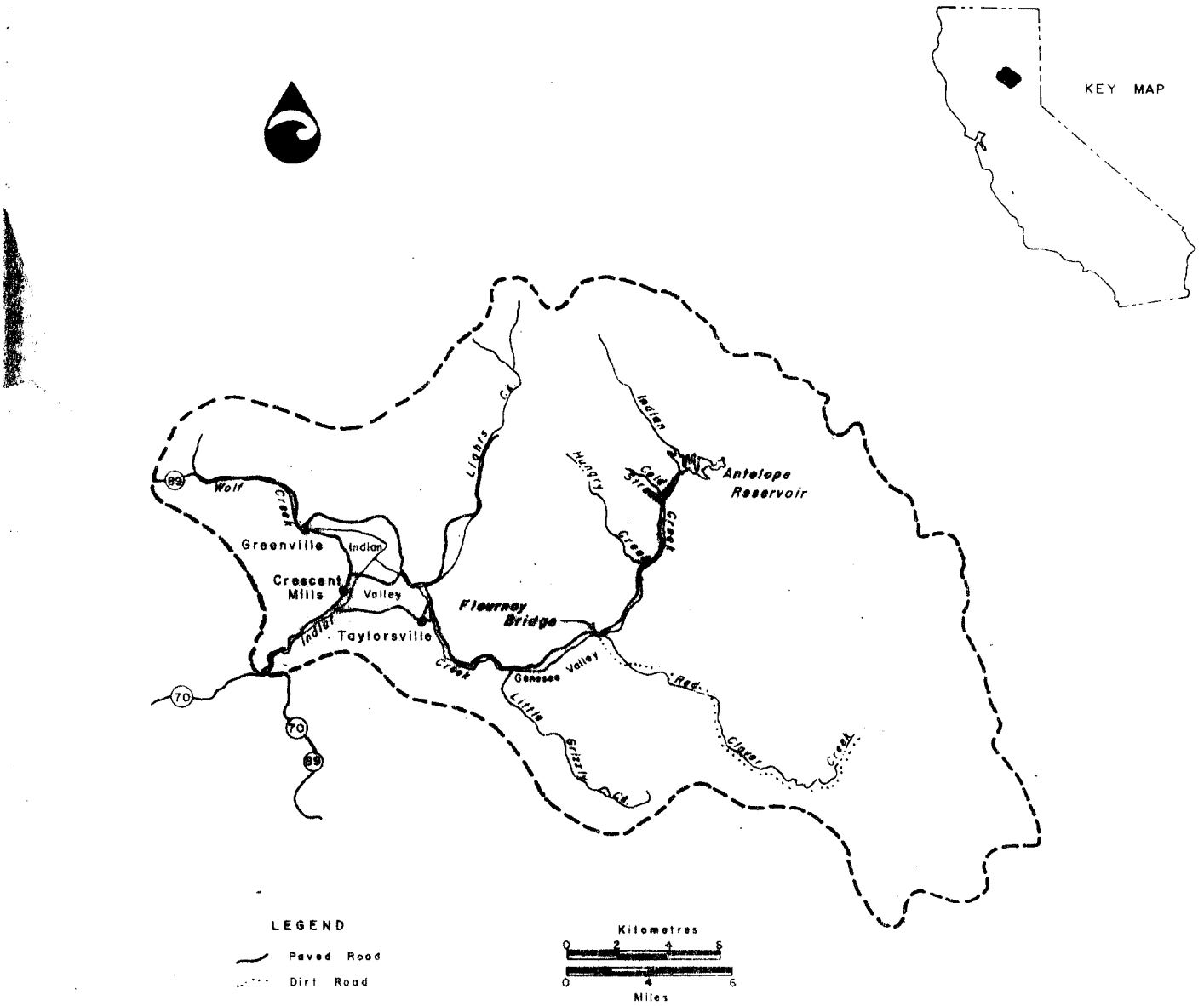

Figure 1 – Antelope Reservoir and Indian Creek, Plumas County, 1981.

METHODS

Recreation Use Counts

Use counts were made on randomly selected dates within nine survey strata using the optimum allocation method described by Abramson and Tolladay (1959). Twenty-nine days of the 205-day study period from April 25 through November 15, 1981, were surveyed; both days of the opening weekend of trout season, 4 of 8 holiday weekend days, 14 of 143 weekdays, and 9 of 52 weekend-days. Five one-hour counts of recreation use were made in the study area each day at regular periods, scheduled according to the number of daylight hours (Appendix II).

The surveys were made from a vehicle or on foot, as necessary, to check access and recreation sites. Recreationists (and their vehicles) were counted and recorded by recreation activity (Appendix III). The five daily counts were totalled and multiplied by factors that accounted for recreation use in the daylight periods not counted. Similarly, the resulting daily figures were expanded to estimate total recreation hours for all days in each stratum. Adding the stratum totals provided an estimate of recreation hours for the study period.

Creel Census

Anglers along Indian Creek were contacted on 30 days to determine fishing success. Each angler was asked for county of residence and length of time spent fishing so far that day. Fish censused were counted, measured (fork length to nearest 0.5 cm [0.2 in]), and identified to species.

To determine total catch, the catch per hour was multiplied by estimated hours of fishing for each stratum. Total weight of trout caught was calculated from estimated catch and length-weight data from Indian Creek (Villa, 1982).

RESULTS

Recreation Use

Total recreation use on upper Indian Creek was estimated at 13,500 recreation hours (± 3,200 hours) for the period April 25 to November 15, 1981.

Overall, camping was the major activity, followed by fishing, relaxing, and gold seeking (Table 1).

TABLE 1

RECREATION HOURS BY ACTIVITY,
UPPER INDIAN CREEK, 1981

Activity	Recreation Hours	Percent
Camping	4,500	33
Fishing	3,600	27
Relaxing	2,000	15
Gold Seeking	1,600	12
Picnicking	800	6
Miscellaneous/Other 1/	1,000	7
Total	13,500	100

1/ Includes children playing, riding, walking, swimming/beach use, sightseeing, hunting, and bird watching

Creel Census Data and Angler Success

During the 1981 trout season, 365 anglers were contacted. They had fished about 875 hours, with a recorded catch of 368 brown trout (Salmo trutta), 54 rainbow trout (Salmo gairdneri), and 3 other fish. Total angling use was estimated at 3,600 (± 1,000 hours) with an estimated catch

of 1,400 brown trout, 200 rainbow trout, and 15 golden shiners. In addition, at least 200 brown trout were caught and released.

The mean length of brown trout caught during 1981 was 20.1 cm (7.9 in) with a range of 12.0 to 49.5 cm (4.7 to 19.5 in) (Appendix IV). The mean length of rainbow trout was 24.1 cm (9.5 in) with a range of 14 to 38.5 cm (5.5 to 15.2 in) (Appendix V). An estimated 116 kg (256 lb) of brown trout and 31 kg (68 lb) of rainbow trout were caught.

Indian Creek angler origin was similar to previous years; most of the fishermen came from northeastern counties (Figure 2).

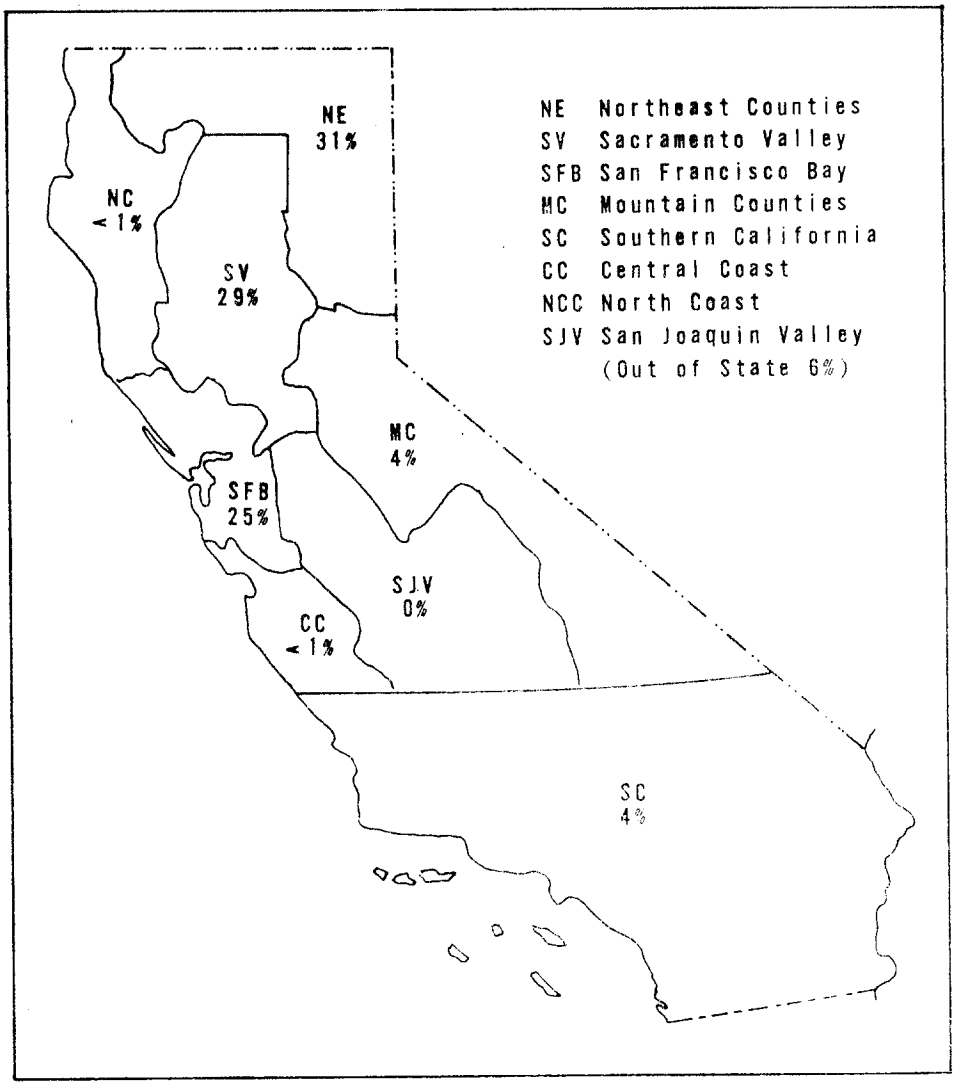

Figure 2-Indian Creek Angler Origin by County Groups 1981

DISCUSSION

Understanding the limitations of the recreation use survey and creel census helps put the data obtained in perspective. This section describes the limitations and compares data from the four years of survey effort (1978-81).

Limitations of Use Counts and Creel Census

Most recreationists on the creek were readily observed during the use counts. Vehicle access points were checked on each count, but people were not found for some vehicles. Vehicles of Forest Service workers, loggers, and other non-recreationists are often parked along the road in this reach of Indian Creek, making vehicle counts a poor index of recreation use. However, from counts of vehicles not associated with people, it appears the estimate of total recreation use may be as much as 25 percent low, a figure similar to previous years.

About 24 percent of the estimated fishing use was represented in the creel census. This is slightly higher than previous years.

Comparison of 1978-81 Survey Results

Previous reports on the Indian Creek survey summarized data for the entire stream. This report focuses on only the upper 18 km (11 mi) of the creek so a comparison of data from the four years we surveyed will illustrate the changes that have occurred in general recreation, fishing use, and angler success in this reach.

After increasing in 1980 over the previous two years, general recreation use dropped sharply in 1981 (Table 2). Very hazardous fire conditions caused the U. S. Forest Service to restrict open fires along the creek after early June. This reduced camping and related activities (primarily relaxing and some miscellaneous activities).

Fishing in 1981 declined to a level similar to 1979 when Antelope Reservoir also did not spill and the downstream release was reduced to 0.28 m^3/s (10 ft^3/s). The large increase in gold seeking in

TABLE 2

ESTIMATED RECREATION HOURS BY ACTIVITY,
UPPER INDIAN CREEK, 1978-81 1/

Activity	Year			
	1978	1979	1980	1981
Fishing	7,000	3,400	8,800	3,600
Camping	5,600	7,700	8,000	4,500
Relaxing	4,200	5,150	2,600	2,000
Picnicking	300	500	700	800
Gold Seeking	300	200	400	1,600
Miscellaneous/Others	1,200	1,050	1,700	1,000
Total	18,600	18,000	22,200	13,500

1/ Source: DWR Technical Information Report Nos. 79-1, 80-1, 81-1, and this report

1981 was due to a class in recreation gold mining taught on June 20-21 at the "Tipsy Tiger" placer claim near the undeveloped camping area just below the mouth of Hungry Creek. By chance we have not previously surveyed on the weekend this class was given.

The catch of both brown and rainbow trout in upper Indian Creek was higher in the two years that Antelope Reservoir spilled and downstream release was held at 0.56 m^3/s (20 ft^3/s) than the years when the reservoir did not spill and the release was reduced to 0.28 m^3/s (10 ft^3/s) (Table 3).

Many of the rainbow trout caught in years the reservoir spills apparently leave the reservoir and become available to anglers fishing the creek. Brown trout, of course, are not present in the reservoir, and are found only in the creek downstream.

Generally, the catch per hour (angler success) for brown trout remained constant the past four years, despite large changes in fishing pressure. Angler success for rainbow trout fluctuated greatly, depending on their availability in the creek. The catch per hour for the two species combined followed a similar pattern. More trout were caught and angler

success was higher in years the reservoir spilled and flows were maintained at 0.56 m^3/s (20 ft^3/s) than in years with a 0.28 m^3/s (10 ft^3/s) release.

TABLE 3

STREAMFLOW AND ESTIMATED ANGLER USE AND CATCH,
UPPER INDIAN CREEK, 1978-81

Year	Streamflow Conditions	Angler Hours	Brown Trout # BN Caught	Brown Trout Catch/ Hour	Rainbow Trout # RT Caught	Rainbow Trout Catch/ Hour	Total Trout # Trout Caught	Total Trout Catch/ Hour
1978	Large spill and 0/56 m^3/s	7,000	3,465	0.50	1,400	0.20	4,865	0.70
1979	Minor spill and 0.28 m^3/s	3,400	1,330	0.39	410	0.12	1,740	0.51
1980	Large spill and 0.56 m^3/s	8,800	2,950	0.34	2,835	0.32	5,785	0.66
1981	No spill and 0/28 m^3/s	3,600	1,400	0.38	200	0.05	1,600	0.43

Source: DWR Technical Information Report Nos. 79-1,80-1,81-1, and this report

ACKNOWLEDGEMENTS

Environmental Specialist Sharon Haines and DFG Biologist Nick Villa directed several Fish and Wildlife Seasonal Aids who conducted the Indian Creek survey in 1981. DFG Aids Ann Schenk, Vance McGowan, and Steve Lund conducted most of the surveys and creel censuses. Ann compiled the data. Sharon Haines, DFG Aid Randy Vance, and DWR Graduate Student Assistant Jerry Tittel also helped with the surveys.

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APPENDIX I

DESCRIPTION OF SURVEY REACH

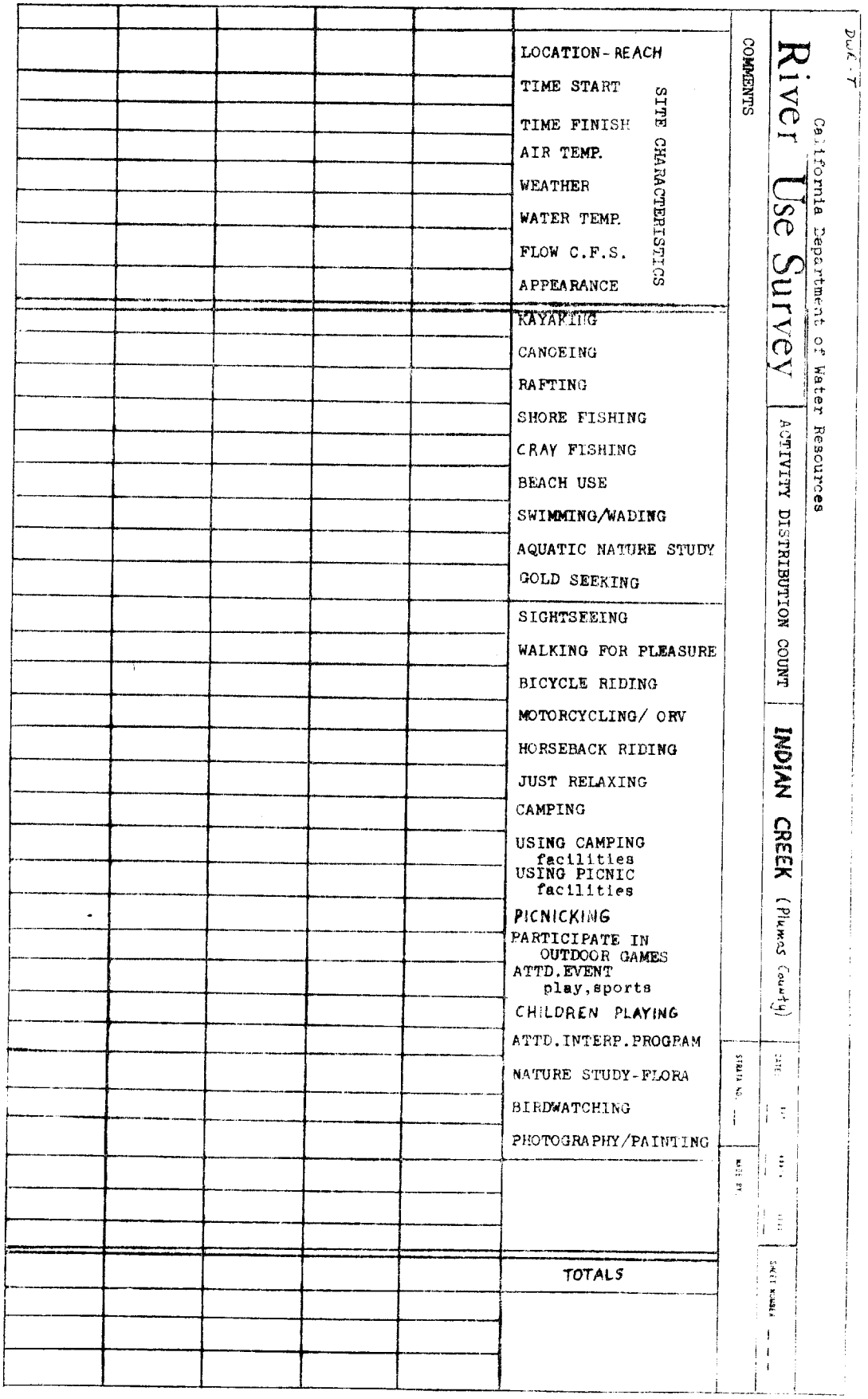
Upper Indian Creek

The first 18 km (11 mi) of creek below Antelope Dam is closely followed by a paved road with wide pullouts for convenient stream access. The creek flows through a granite canyon timbered with pine and fir. Parts of the canyon floor are meadowlike, especially at the upper ends of the reach. Elevation ranges from 1 500 m (4,900 ft) at the dam to 1 100 m (3,700 ft) at Flournoy Bridge. All but the lower 1.6 km (1 mi) of stream is within Plumas National Forest. Water releases were controlled at about 0.28 m^3/s (10 ft^3/s) during the 1981 survey. The stream remains cold in summer due to deep-water outflow from the dam and is usually slightly turbid. Abundant brown trout and a few rainbow trout comprise the fishery. Some rainbow trout enter the creek from Antelope Lake when it spills. Sacramento squawfish and brown bullhead also occur in the lowermost portion, where the creek enters Genesee Valley.

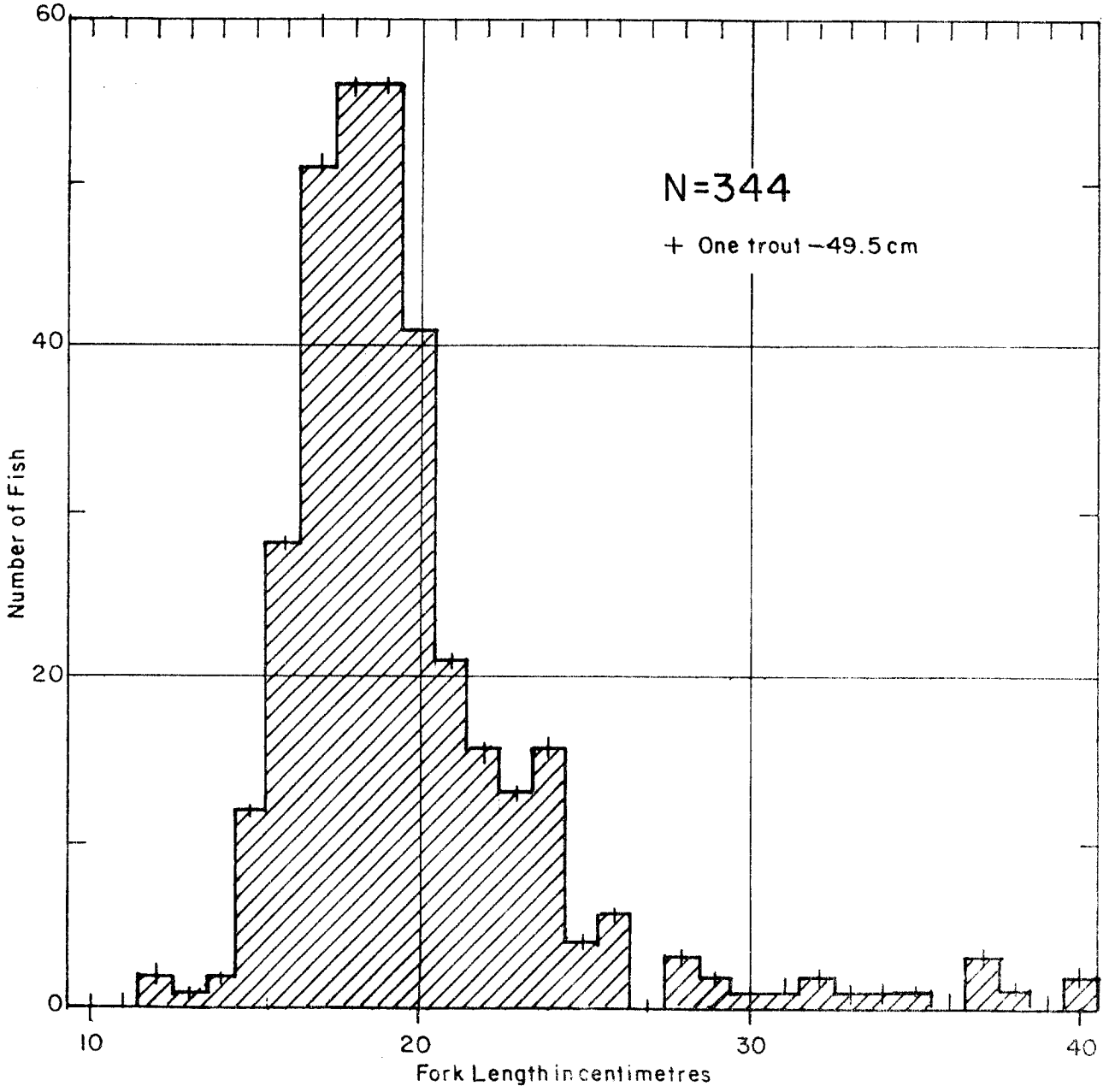
APPENDIX II

1981 INDIAN CREEK RECREATION
USE COUNT SCHEDULE

Date	Daylight Hours	Use Counts		Creel Census Time (approx.)
		Count	Time	
April 25 PST	15½	1st	0630-0730	0800-1200
		2nd	0900-1000	1400-1800
		3rd	1200-1300	
		4th	1430-1530	
		5th	1730-1830	
April 26 DST	15½	1st	0730-0830	0800-1200
		2nd	1000-1100	1500-1900
		3rd	1300-1400	
		4th	1530-1630	
		5th	1830-1930	
May-August DST	16½	1st	0700-0800	0900-1300
		2nd	1000-1100	1600-2000
		3rd	1300-1400	
		4th	1600-1700	
		5th	1900-2000	
September DST	14	1st	0730-0830	0900-1300
		2nd	1000-1100	1400-1800
		3rd	1230-1330	
		4th	1500-1600	
		5th	1730-1830	
October DST	13	1st	0800-0900	0900-1300
		2nd	1000-1100	1400-1800
		3rd	1230-1330	
		4th	1500-1600	
		5th	1700-1800	
November PST	12	1st	0730-0830	0800-1200
		2nd	0930-1030	1300-1700
		3rd	1130-1230	
		4th	1330-1430	
		5th	1530-1630	


California Department of Water Resources
River Use Survey
ACTIVITY DISTRIBUTION COUNT
INDIAN CREEK (Plumas County)
SITE CHARACTERISTICS
LOCATION - REACH
TIME START
TIME FINISH
AIR TEMP.
WEATHER
WATER TEMP.
FLOW C.F.S.
APPEARANCE
KAYAKING
CANOEING
RAFTING
SHORE FISHING
CRAY FISHING
BEACH USE
SWIMMING/WADING
AQUATIC NATURE STUDY
GOLD SEEKING
SIGHTSEEING
WALKING FOR PLEASURE
BICYCLE RIDING
MOTORCYCLING/ ORV
HORSEBACK RIDING
JUST RELAXING
CAMPING
USING CAMPING facilities
USING PICNIC facilities
PICNICKING
PARTICIPATE IN OUTDOOR GAMES
ATTD. EVENT play, sports
CHILDREN PLAYING
ATTD. INTERP. PROGRAM
NATURE STUDY-FLORA
BIRDWATCHING
PHOTOGRAPHY/PAINTING
TOTALS
COMMENTS

Appendix IV
Length Frequency of Censused Brown Trout
Indian Creek, 1981



Appendix V
Length Frequency of Censued Rainbow Trout
Indian Creek, 1981